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June 27, 2018

Ms. Carolyn d'Almeida  
Remedial Project Manager  
Federal Facilities Branch (SFD 8-1)  
US EPA Region 9 Laboratory  
1337 South 46th Street, Building 201  
Richmond, CA 94804

**Subject: Contract No. EP-W-07-066, Task Order No 066-016-09Q1, Williams Air Force Base Task Order, Containment Plan for Site ST012, Former Williams Air Force Base, Mesa, Arizona**

Dear Ms. d'Almeida:

TechLaw has developed a preliminary strategy to ensure an appropriate containment plan for Site ST012 is developed. This preliminary strategy includes: (1) Collection of Groundwater Levels to Develop Groundwater Elevation Contour Maps, (2) Installation of Monitoring Wells Beyond Perimeter Well/Downgradient Wells; (3) Evaluation of Extraction at Downgradient Well Locations; and, (4) Establishment of Containment Criteria.

Additional monitoring wells in the Cobble Zone (CB), Upper Water Bearing Zone (UWBZ), and Lower Saturated Zone (LSZ) are recommended, as shown on the attached three figures taken from Resubmitted Final Pilot Study Implementation Work Plan for Operable Unit 2, Revised Groundwater Remedy, Site ST012, Former Williams Air Force Base, Mesa, Arizona, dated April 5, 2018 (the Pilot Study WP).

We appreciate the opportunity to provide technical support services to U.S. EPA on this Task Order. Should you have any questions or comments, please contact me or the TechLaw Project Manager, Nicole Goers, at (540) 836-0420.  
Sincerely,

A handwritten signature in cursive script, appearing to read 'Indira D. Balkissoon'.

Indira Balkissoon  
ROC 9 Senior Task Order Manager

KB:NG:IB:as

cc: Central files, TechLaw, Inc.

**FORMER WILLIAMS AIR FORCE BASE  
Mesa, Arizona**

**Containment Plan for Site ST012**

**Submitted to:**

**Ms. Carolyn d'Almeida  
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**Submitted by:**

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**Task Order No.  
Contract No.  
EPA TOCOR  
Telephone No.  
TechLaw TO Manager  
Telephone No.**

**066-016-09Q1  
EP-W-07-066  
Carolyn d'Almeida  
(415) 972-3150  
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(540) 836-0420**

**June 27, 2018**

## Containment Plan for Site ST012

The following represents a preliminary strategy to ensure an appropriate containment plan for Site ST012 is developed. This preliminary strategy includes:

### 1. Collection of Groundwater Levels to Develop Groundwater Elevation Contour Maps.

The current understanding of groundwater flow in the Cobble Zone (CZ), Upper Water Bearing Zone (UWBZ), and Lower Saturated Zone (LSZ) is based on modeling presented in the Resubmitted Final Pilot Study Implementation Work Plan for Operable Unit 2, Revised Groundwater Remedy, Site ST012, Former Williams Air Force Base, Mesa, Arizona, dated April 5, 2018 (the Pilot Study WP); however, the groundwater modeling results have not been verified using current monitoring data from Site ST012. In order to develop an appropriate containment plan for Site ST012 and substantiate the groundwater model, groundwater elevation/potentiometric surface contour maps should be developed for each unit (CZ, UWBZ, and LSZ) using groundwater and product elevation data collected from as many wells as possible during a single synchronized gauging event. Groundwater elevation/potentiometric surface maps should be generated from data collected using an oil/water interface probe corrected for the presence of product, if present. If possible, groundwater elevation/potentiometric surface maps should be generated using data collected before groundwater extraction began, after groundwater extraction began and using current data. Once sulfate injections begin, groundwater elevation/product level measurements should be collected bi-weekly.

### 2. Installation of Monitoring Wells Beyond Perimeter Well/Downgradient Wells.

Based on Figure 3-2 (EBR Injection, Extraction, and Monitoring Well Locations - CZ) of the Pilot Study WP, no CZ monitoring wells exist beyond ST012-CZ023, between ST012-CZ21 and ST012-CZ24, or between ST012-CZ09 and ST012-C02 to delineate the nature and extent of contamination. Given the benzene concentration detected at ST012-CZ023, immediate installation of four additional CZ monitoring wells is warranted to evaluate the extent of contamination and plume displacement during sulfate injections:

- Approximately 150 feet East-northeast (downgradient) of ST012-CZ023 (Figure 3-2, location 1)
- North of ST012-CZ023 (Figure 3-2, location 2)
- East-southeast of ST012-CZ09 (Figure 3-2, location 3)
- East of ST012-CZ21 (Figure 3-2, location 4)

Based on Figure 3-3 (EBR Injection, Extraction, and Monitoring Well Locations - UWBZ) of the Pilot Study WP, no UWBZ monitoring wells exist beyond ST012-UWBZ09, between ST012-UWBZ12 and ST012-U02, between ST012-UWBZ32 and ST012-UWBZ31, or between ST012-UWBZ21 and ST012-U02 and ST012-UWBZ38 to delineate the nature and extent of contamination. Installation of four additional UWBZ monitoring well is warranted:

- East of ST012-UWBZ09 (Figure 3-3, location 1)
- East of ST012-UWBZ12 (Figure 3-3, location 2)
- Northeast of ST012-UWBZ32 (Figure 3-3, location 3)

- East of ST012-UWBZ21 (Figure 3-3, location 4)

In addition, inclusion of existing monitoring well ST012-UWBZ17, located northeast of ST012-UWBZ10, in the groundwater sampling program is warranted to delineate the nature and extent of contamination.

Based on Figure 3-4 (EBR Injection, Extraction, and Monitoring Well Locations - LSZ) of the Pilot Study WP, no LSZ monitoring wells exist northeast of ST012-LSZ44, east of ST012-W34, northeast of ST012-LSZ45, east of ST012-W36, or between northeast of ST012-W36 to delineate the nature and extent of contamination. Installation of five additional LSZ monitoring wells is warranted:

- Northeast of ST012-LSZ44 (Figure 3-4, location 1)
- East of ST012-W34 (Figure 3-4, location 2)
- Northeast of ST012-LSZ45 (Figure 3-4, location 3)
- East of ST012-W36 (Figure 3-4, location 4)
- Northeast of ST012-W36 (Figure 3-4, location 5)

Existing and additional monitoring wells should be sampled and analyzed for volatile organic compounds (VOCs) (Method 8260B), total petroleum hydrocarbon (TPH) (Method 8015D, DRO/GRO), inductively coupled plasma (ICP) Metals (Method 6010B), nitrate and sulfate (Method 2320B), alkalinity (SM 2320B), sulfate field screening, and evaluated using light nonaqueous phase liquid (LNAPL) Dye Test Kits.

3. **Evaluation of Extraction at Downgradient Well Locations.** Given the benzene detections at ST012-CZ23 during the re-baseline sampling event in April 2018 [97 micrograms per liter (ug/L)] and the follow-on sampling event in May 2018 (90 ug/l, preliminary result), extraction at ST012-CZ07 alone is insufficient to prevent further migration. Specifically, extraction at ST012-CZ07 did not impact the benzene concentration detected at ST012-CZ023 during the follow-on sampling event in May 2018. As such, extraction at ST012-CZ07 is insufficient to prevent the migration of contamination. Extraction at ST012-CZ09, ST012-CZ23, ST012-UWBZ09, ST012-UWBZ12, and ST012-LSZ14 should be evaluated, following Steps 1 and 2, to prevent further downgradient migration. However, downgradient monitoring wells should be installed before perimeter extraction begins so that the effect of additional extraction on the plume can be monitored.
4. **Establishment of Containment Criteria.** Containment criteria are needed to ensure the enhanced bioremediation (EBR) design does not result in plume displacement. Baseline sampling should be conducted before sulfate injection and starting extraction in additional wells. The criteria should be applied to baseline sampling results. For example,
  - **Baseline sampling benzene concentration at 5 micrograms per liter (ug/L) or below:** If the benzene concentration doubles (maximum detected concentration of 10 ug/L), EBR injections should be immediately suspended and only extraction wells should be operated.

- **Baseline sampling benzene concentration between 5 ug/L and 10 ug/L or greater than 10 ug/L:** If the benzene concentration increases by 25% (maximum detected concentration of 12.5 ug/L in perimeter wells), EBR injections should be immediately suspended and only extraction wells should be operated.